Patent Claims

1. Transmission system, in particular an automatic transmission (ASG) of a motor vehicle, with a shift mechanism for actuating the transmission system, comprising
   - a selection-shift-passageway device in which a selector fork can be moved;
   - at least one actuating device for controlling of the selector fork;
   - at least one position sensor for detecting the selector fork movement in the selection direction and in the shift direction;
   - at least one selector shaft and
   - at least one device for automatically establishing at least one predetermined parameter, specifically a geometric parameter, of the shift mechanism, such as a predetermined parameter of the selector shaft and /or a predetermined parameter of the selection-shift-passageway device and/or a predetermined parameter of the actuating device, wherein this parameter can be established starting from an unknown selector fork position within the selection-shift-passageway device.

2. Transmission system, especially in accordance with claim 1, characterized in that the parameter is a distance measurement and/or the identity of an engaged gear.

3. Transmission system in accordance with at least one of the claims 1 and 2, characterized in that the device for establishing the predetermined transmission geometric values moves the selector fork, at least part of the time, starting from the unknown selector fork position, in and /or up to the detected stops in the orientation of this direction, and/or starting from the

unknown selector fork position in the shift direction up to the detected stops in the orientation of this direction, wherein under predetermined conditions

- the passageways of movement detected during this process are evaluated in accordance with a predetermined characteristic value;
- based upon this evaluation and/or based on miscellaneous specific values a new predetermined position for the selector fork is approached, which then becomes the basis for establishing the passageways of movement in the shift direction and/or the selection direction;
- those established passageways of movement and/or predetermined values are used as the basis for a new analysis; and
- this procedure of approaching a new selector fork position, the process and the analysis, is repeated until all predetermined geometric transmission values have been established.

4. Transmission system in accordance with at least one of the claims 1 through 3, characterized by at least one geometric value detecting device, which, under predetermined conditions, starting from an unknown selector fork position in terms of its coordinates within the selection-shift-passageway device, at least part of the time approaches a predetermined reference point in accordance with a predetermined characteristic value within this selection-shift-passageway device, specifically a reference point that represents a stop, so that, starting from this reference point, in accordance with a second predetermined characteristic value, predetermined selector fork positions can be approached for the purpose of detecting predetermined geometric values.

5. Transmission system, especially in accordance with at least one of the previous claims, characterized in that the detectable geometric transmission values are comprised of at least one neutral gear position

and/or at least one synchronous position and/or at least one passageway position and/or at least one passageway width.

6. Transmission system, especially in accordance with at least one of the previous claims, characterized in that, for the purpose of detecting the geometric transmission values, at least one passageway wall and/or at least one stop is approached; this passageway wall and/or this stop are detected under predetermined conditions, based upon predetermined values and/or value changes, such as speed change and/or tension change of the actuating device and/or current change of the actuating device and/or engine angular position change and/or engine speed of the actuating device and/or engine tension of the actuating device and/or engine current of the actuating device.

7. Transmission system with a shift mechanism for its actuation, comprising
   - a selection-shift-passageway device, in which a selector fork can be moved;
   - at least one actuating device for controlling the selector fork;
   - at least one position sensor for detecting the selector fork movement in the selection direction and the shift direction;
   - at least one selector shaft; and
   - at least one device for establishing and/or monitoring and/or fine tuning the neutral position of the transmission, which controls the selector fork, at least part of the time under predetermined conditions, such that the selector fork is moved along a passageway in such as manner that it is moved in the selection passageway on passageways that are basically parallel to the selection passageway axis while incrementally approaching one of the longitudinal walls of the selection passageway, until the selector fork is deflected or stopped by at least one area of one of the longitudinal walls in its passageway that is parallel to the selection passageway axis, so that a boundary positioned longitudinally

in the selection passageway is detected for the neutral transmission position.

8. Transmission system with a shift mechanism for its actuation, comprising
   - a selection-shift-passageway device in which a selector fork can be moved;
   - at least one actuation device for controlling the selector fork;
   - at least one position sensor for detecting the selector fork movement in the selection direction and the shift direction;
   - at least one selector shaft; and
   - at least one absolute position-detecting device, which under predetermined conditions, starting from an unknown position of the selector shaft and/or the selector fork within the selection-shift-passageway device, establishes at least one predetermined absolute position of the selector shaft and/or the selector fork within the selection-shift-passageway device.

9. Transmission system, especially in accordance with at least one of the previous claims, with an absolute position detecting device, which under predetermined conditions determines an absolute position of the selector shaft and/or the selector fork, basically independent from the actuating forces of the shift mechanism.

10. Transmission system, especially in accordance with at least one of the previous claims, in particular in accordance with at least one of the claims 8 and 9, characterized by at least one sensor device and at least one signal area, wherein
   - the sensor device detects a signal from the signal area at least part of the time;

- the signal detected by the sensor device can assume at least two different signal values, depending upon the position of the signal area being scanned;
- the signal area corresponds to a pattern that is projected onto the selection-shift-passageway device, which contains a plurality of field-shaped areas, each of which is assigned to a predetermined signal value; and
- the signal course detected by the sensor device and/or the signal value detected by the sensor changes when the selector fork passes over a contact line of those adjacent bordering areas.

11. Transmission system, especially in accordance with claim 10, characterized in that the signal area is positioned on the sensor shaft.

12. Transmission system, especially in accordance with at least one of the claims 10 and 11, characterized in that the sensor device is a digital sensor and/or the signal area is a digital signal area.

13. Transmission system, especially in accordance with at least one of the previous claims, characterized in that each of the field-shaped areas of the pattern that is projected onto the selection-shift-passageway device is aligned basically parallel to at least one of the axes of the passageways.

14. Transmission system, especially in accordance with at least one of the previous claims, characterized in that the pattern projected onto the selection-shift-passageway device is designed such that the absolute position of the selector fork and/or of at least one shaft of the actuating device can be determined clearly within up to three movements of the selector fork.

15. Transmission system, especially in accordance with at least one of the previous claims, characterized in that within at least one of the passageways two areas of the pattern projected onto the selection-shift-passageway device are arranged at least in part - with different signal values being assigned to them - such that, with a movement of the selector fork to and/or beyond its bordering contact line, an absolute selection position can be clearly determined.

16. Transmission system, especially in accordance with at least one of the previous claims, characterized in that within at least one of the passageways two of the areas of the pattern projected onto the selection-shift-passageway device are arranged at least in part such that, with a movement of the selector fork at and/or near its bordering contact line an absolute shifting position can be unequivocally determined. Those areas are grouped into different signal values.

17. Transmission system, especially in accordance with at least one of the previous claims, characterized in that the sensor device contains at least one sensor from a group of sensors, which includes electromechanical calipers, a Hall effect sensor, an inductive sensor, an optical sensor, a capacitive sensor, a sound sensor system, an electric collector based upon a collecting bar, or similar devices.

18. Transmission system, especially in accordance with at least one of the previous claims, characterized in that the signal area is arranged on and/or near the selector shaft in the form of surface elevations and surface indentations.

19. Transmission system, especially in accordance with at least one of the claims 8 through 18, characterized by at least one evaluation device, which stores the position of the pattern projected onto the selection-shift-

passageway device, and which, under predetermined conditions, based especially on the position of this stored pattern and on the detected sensor values, clearly determines an absolute position in the selection direction and/or the shift direction.

20. Transmission system, especially in accordance with at least one of the previous claims, characterized by at least one incremental distance sensor for the selection direction and at least one incremental distance sensor for the shift direction, which can be set at a predetermined time to a predetermined value, especially to zero, wherein a predetermined value from the incremental distance sensor can be assigned to an absolute position.

21. Transmission system, especially in accordance with at least one of the claims 8 through 20, characterized in that, in at least one shift passageway in at least one predetermined position in the selection direction, two areas of the pattern that is projected onto the selection-shift-passageway device, to which different signal values are assigned, meet one another along a contact line that is aligned at least in part along the longitudinal axis of this shift passageway.

22. Transmission system, especially in accordance with at least one of the claims 8 through 21, characterized in that, in at least one of the shift passageways, in at least one predetermined position in the shift direction, two areas of the pattern that is projected onto the selection-shift-passageway device, to which different signal values are assigned, meet one another along a contact line that is aligned at least in part in the transverse direction of this shift passageway.

23. Transmission system, especially in accordance with at least one of the claims 8 through 22, characterized in that, in the selection passageway, in

at least one predetermined position in the shift direction, two areas of the pattern that is projected onto the selection-shift-passageway device, to which different signal values are assigned, meet one another along a contact line that is aligned at least in part along the longitudinal axis of this selection passageway.

24. Transmission system, especially in accordance with at least one of the claims 8 through 23, characterized in that, in the selection passageway, in at least one predetermined position in the selection direction, two areas of the pattern that is projected onto the selection-shift-passageway device, to which different signal values are assigned, meet one another along a contact line that is aligned at least in part in the transverse direction of this selection passageway.

25. Transmission system with a shift mechanism for its actuation with
- a selection-shift-passageway device, in which a selector fork can be moved;
- at least one actuation device for controlling the selector fork;
- at least one position sensor for detecting the selector fork movement in the selection direction and the shift direction;
- at least one selector shaft; and
- at least one sensor device with at least three stages, which interacts with a component that is moved during the shifting process, in particular with the selector shaft, such that at least three different positions and/or position areas of the selector shaft and/or the selector fork can be differentiated within the selection-shift-passageway device.

26. Transmission system in accordance with claim 25, characterized in that a profile is incorporated on the shell surface of the selector shaft, which is designed for the identification of predetermined shifting positions such that indentations of various depths extend from the surface into the interior part

of the shaft; those indentations are detected and/or differentiated at least part of the time by the sensor device in at least three stages.

27. Transmission system, especially in accordance with at least one of the claims 25 through 26, characterized in that a first indentation with a first depth for identification of the neutral position, and a second indentation with a second depth, which differs from the first one, for identification of the reverse gear, are arranged on the surface of the selector shaft, wherein the sensor device contains a first gear stage that corresponds to the first indentation, a second gear stage that corresponds to the second indentation, and a third gear stage that corresponds to the surface position positioned in the axial direction of the selector shaft between those indentations.

28. Transmission system with a shift mechanism for its actuation, comprising
- a selection-shift-passageway device, in which a selector fork can be moved;
- at least one actuation device for controlling the selector fork;
- at least one position sensor for detecting the selector fork movement and/or position in the selection direction and the shift direction;
- at least one selector shaft; and
- at least one redundancy sensor device for checking and/or adapting the position sensor, which under predetermined conditions clearly differentiates predetermined transmission positions from other transmission positions, wherein especially the transmission positions "final gear position" and/or "neutral gear position" can be differentiated from the other transmission positions.

29. Transmission system with a shift mechanism for its actuation, comprising
- a selection-shift-passageway device, in which a selector fork can be moved;

- at least one actuating device for controlling the selector fork;
- at least one position sensor for detecting the movement of the selector fork in the selection direction and the shift direction;
- at least one selector shaft, wherein a profile is arranged on the outer surface of the selector shaft, which contains different potential areas relative to the axis of the selector shaft, wherein predetermined final gear positions and/or the neutral position are assigned predetermined potentials;
- a retainer, which contains a spring-loaded ball oriented basically radially to the selector shaft, which under the spring effect, rests against the profile of the selector shaft; and
- at least one sensor and/or switch, which is preferably integrated into the retainer and which detects, at least in part, a predetermined ball movement, especially a translatory ball movement, for testing the functionality of the actuation device and/or the position sensor, especially for examining the selecting and/or shift motor.

30. Transmission system, especially in accordance with claim 29, characterized in that, for each final gear position and for the neutral position, predetermined information potential on the selector shaft's surface profile is provided.

31. Transmission system, especially in accordance with claim 30, characterized in that the potentials of the final gear positions and the neutral position are identical.

32. Transmission system, especially in accordance with at least one of the claims 28 through 31, characterized in that the retainer and/or the sensor for detecting the surface potential of the selector shaft is a redundancy sensor, which can indicate the position of the selector shaft.

33. Transmission system, especially in accordance with claim 32, characterized in that the redundancy sensor serves the purpose of examining the functionality of a position sensor, which is provided for detecting the position and/or the movement of the selector fork within the selection-shift-passageway device, and/or the position of the selector shaft.

34. Transmission system with a shift mechanism for its actuation, comprising
- a selection-shift-passageway device, in which a selector fork can be moved;
- at least one actuation device for controlling the selector fork;
- at least one position sensor for the detecting the selector fork movement in the selection direction and the shift direction;
- at least one selector shaft; and
- at least one neutral reference device, which under predetermined conditions, starting from one unknown selector fork position, determines and/or engages the neutral gear;

wherein, in establishing and/or engaging the neutral gear, based upon the shifting pattern, the controlled directions of movement of the selector fork are aligned such that a movement of the selector fork in predetermined, critical shift passageways is prevented.

35. Transmission system in accordance with claim 34, characterized in that the forces that are applied to the selector fork by the neutral reference device always include a direction from a group of directions, which comprises the direction of the selection passageway, and directions that contain a vectorial component in the direction of the selection passageway and a vectorial direction in the direction of the shift passageways; each of those components does not equal zero, and such directions and orientations are ruled out which correspond to the direction and orientation of an arbitrary vector that is directed at any random point on the predetermined, critical shift passageway from any random point on the selection passageway,

which is located outside the intersecting areas between the predetermined, critical shift passageways and the selection passageway.

36. Transmission system, especially in accordance with at least one of the claims 34 and 35, characterized in that the predetermined critical shift passageways comprise the shift passageway of the 1st gear and the shift passageway of a reverse gear.

37. Transmission system, especially in accordance with at least one of the claims 34 through 36, characterized in that the predetermined, critical shift passageways are arranged in a double-H shifting diagram diametrically opposite one another and oriented outward.

38. Transmission system, especially in accordance with at least one of the claims 34 through 37, characterized in that the neutral reference device begins to engage and/or control the neutral gear when
- predetermined, detected actuation parameters contradict the detected and/or calculated gear, especially when, in the case of a disengaged clutch, the detected gear does not coincide with the gear that has been calculated based upon the engine speed and the vehicle speed; and/or
- unknown stops are detected in the transmission; and/or
- incremental sensors are receiving error signals; and/or
- during travel, the passageway information provided by the incremental sensors is reset and/or is not available; and/or
- predetermined components of the shift mechanism and/or its control device have been added and/or replaced.

39. Transmission system, especially in accordance with at least one of the claims 34 through 38, characterized in that the neutral reference device initiates neutral reference movement only when it has been ensured that a motor vehicle with a transmission system has been found to be in

predetermined operating conditions, such as outside of kick-down operation or below predetermined speed values.

40. Transmission system, especially in accordance with at least one of the previous claims, characterized in that the neutral reference device initiates neutral reference movement only when the throttle valve of a motor vehicle assumes a predetermined angle.

41. Transmission system, especially in accordance with at least one of the claims 34 through 40, characterized in that the neutral reference device prevents the gear from being engaged during neutral reference movement.

42. Transmission system, especially in accordance with at least one of the claims 34 through 41, characterized in that the neutral reference device initiates neutral reference movement only when the speed of the motor vehicle is below a predetermined motor vehicle speed, especially when the motor vehicle speed is basically zero.

43. Transmission system, especially in accordance with at least one of the claims 34 through 42, characterized in that during a neutral reference movement the neutral reference device performs at least partial tactile and pressing movements in accordance with a predetermined characteristic value, wherein a tactile movement corresponds to a advancement of the selector fork, which is continued until a stop is detected and/or a predetermined maximum passageway has been covered, and wherein a pressing movement corresponds to an advancement of the selector fork, which is continued until a traversing movement in the controlled direction is detected.

44. Transmission system, especially in accordance with at least one of the claims 34 through 43, characterized in that, under predetermined error conditions, the reference movement is interrupted and/or repeated.

45. Transmission system, especially in accordance with at least one of the claims 34 through 44, characterized in that the neutral reference device detects the selector fork position in the shift direction, at least part of the time, after locating the selection passageway in accordance with a predetermined characteristic value.

46. Transmission system with a shift mechanism for its actuation, comprising
- a selection-shift-passageway device, in which a selector fork can be moved;
- at least one actuation device for controlling the selector fork;
- at least one position sensor for detecting the selector fork movement in the selection direction and the shift direction;
- at least one selector shaft; and
- at least one geometry detection device, which presses and overpresses and finally releases the selector fork under predetermined conditions against a predetermined stop, specifically against a passageway wall, so that the selector fork assumes basically a force-free position; based upon this position, in accordance with a predetermined characteristic value, a predetermined parameter of the transmission geometry, such as a neutral gear position, can be determined.

47. Transmission system in accordance with claim 46 characterized in that the geometry detection device establishes at least one, but especially all, neutral gear positions under predetermined conditions, wherein for the determination of a neutral gear position the selector fork is moved to a respective shift passageway end, and is then overpressed at this stop at the passageway end, until the outside force being applied to the selector

fork is at least reduced; the resulting restoring forces then cause the selector fork to be moved into a force-free position, which, in accordance with a predetermined characteristic value, includes a predetermined position relative to the neutral gear position.

48. Transmission system, especially in accordance with at least one of the claims 46 and 47, characterized in that the geometry detection device, under predetermined conditions, presses and overpresses the selector fork against a predetermined wall of the passageway device, and then releases it, especially in a controlled release, so that at least one geometric characteristic of the selection-shift-passageway device, such as the position of a passageway wall and/or the width of a passageway, etc., can be determined and/or adapted based upon the position assumed by the selector fork after it has been released.

49. Transmission system, especially in accordance with at least one of the claims 46 and 48, characterized in that, under predetermined conditions, the geometry detection device aligns and/or initiates and/or examines at least one incremental passageway sensor by controlling the selector fork in accordance with a predetermined characteristic value, wherein the geometry detection device presses and overpresses the selector fork at a predetermined position against a predetermined stop, before releasing it again, especially in a controlled release; the resulting restoring forces cause the selector fork to assume basically a force-free position, which is used, in accordance with a predetermined characteristic value, in the alignment and/or the initiation of the incremental passageway sensor device.

50. Transmission system with a shift mechanism for its actuation, comprising
- a selection-shift-passageway device, in which a selector fork can be moved, wherein, if the gear is completely engaged, the selector fork is

arranged within a predetermined shift passageway in an area that is assigned to this gear and/or this final gear position, allowing for clearance in perpendicular directions;

- at least one actuation device for controlling the selector fork;
- at least one position sensor for detecting the selector fork movement and/or position in the selection direction and the shift direction;
- at least one selector shaft; and
- at least one gear coding device, which encodes each of the engaged gears in such a way that the identity of the engaged gear can be determined independently from the end value of the position sensor, which is active when the gear is engaged with the selector fork movement and/or the movement of the actuation device.

51. Transmission system in accordance with claim 50, characterized in that the identity of the gear is determined, wherein the selector fork remains in its final gear position.

52. Transmission system, especially in accordance with at least one of the claims 50 and 51, characterized in that the identity of the gear can be determined by displacing the selector fork within the final gear position.

53. Transmission system, especially in accordance with at least one of the claims 50 and 51, characterized in that the identity of the gear is at least in part determined based upon predetermined geometric characteristic values of the shifting gate of the transmission, wherein the selector fork remains in its final gear position.

54. Transmission system, especially in accordance with one of the previous claims, characterized in that each of the final gear positions is are bordered by at least two, preferably three, passageway walls.

55. Transmission system, especially in accordance with at least one of the claims 50 and 54, characterized in that while the gear is being engaged, the gear coding device positions the selector fork within the clearance area of the final gear position, under predetermined conditions, in a predetermined position that characterizes the gear; hence, the gear identity is determined at least in part by establishing the relative position to at least one predetermined point on the boundary of the final gear position, independent of a final value of the position sensor, which accompanies the selector fork movement and/or the movement of the actuating device when the gear is being engaged.

56. Transmission system, especially in accordance with claim 55, characterized by a characteristic assignment value, which assigns the identity of predetermined gears to predetermined positions and/or position areas within the final gear positions.

57. Transmission system, especially in accordance with at least one of the claims 50 through 56, characterized in that the gear coding device for the purpose of decoding measures, at least in part, the distance to at least one of the walls of the final gear position.

58. Transmission system especially in accordance with claim 57, characterized in that at least two shift passageways have different passageway widths in the area of the final gear positions.

59. Transmission system, especially in accordance with at least one of the claims 50 through 58, characterized in that for coding the identity of at least one gear, the selector fork rests within the plane of the selection-shift-passageway device at the top and left and/or top and right and/or bottom and left and/or bottom and right and/or top, and has a predetermined

distance to the left and right boundaries of the final gear position, and/or has a predetermined distance.

60. Transmission system, especially in accordance with at least one of the claims 50 through 59, characterized in that, under predetermined conditions, the gear-coding device decodes the coded gear identities based upon geometric values for the selection-shift-passageway device.

61. Transmission system, especially in accordance with at least one of the claims 50 through 60, characterized in that gear identity encoded by the gear coding device represents a redundancy for the gear identity and/or the position information, which is generated via a position sensor, and which accompanies the selector fork movement and/or the movement of the actuating device when the gear is engaged.

62. Transmission system with a shift mechanism for its actuation, comprising
- a selection-shift-passageway device, in which a selector fork can be moved, wherein the selector fork is allowed clearance from the walls of the shift passageway, in the selection direction within the shift passageway;
- at least one actuation device for controlling the selector fork;
- at least one position sensor for detecting the selector fork movement in the selection direction and the shift direction;
- at least one selector shaft; and
- at least one selection motor monitoring device, which controls the selector fork - when the gear is being engaged and/or disengaged – in accordance with a predetermined characteristic value, such that the selector fork changes its position within the shift passageway in the selection direction; by comparing this characteristic and/or this passageway of movement with the values of a position sensor, which is

connected to the selection motor, the functionality of the position sensor and/or the selection motor can be examined.

63. Transmission system with a shift mechanism for its actuation with

- a selection-shift-passageway device, in which a selector fork can be moved;
- at least one actuation device for controlling the selector fork;
- at least one position sensor for detecting the selector fork movement in the selection direction and the shift direction;
- at least one selector shaft; and
- at least one gear plausibility examination device, which determines whether or not a gear is engaged, and/or if so, which gear is engaged; the gear plausibility examination device makes this determination under predetermined conditions, basically independent of the forces of elasticity of the elements located in a transmission passageway between a position sensor that is arranged on the actuation device, and a shifting fork.

64. Transmission system, especially in accordance with claim 63, characterized in that the gear plausibility examination device recognizes a gear under predetermined conditions when the actual position of the selector fork deviates less than a predetermined limit from the assigned target position of this gear, and when the selection motor and/or the selector fork reach the target position within a specified period of time, and/or upon reaching this target position, remain in a switched-off hysteresis for at least a specified period of time.

65. Transmission system in accordance with claim 64 characterized in that the predetermined passageway width boundary corresponds to the individual passageway.

66. Transmission system with a shift mechanism for its actuation, comprising
- a selection-shift-passageway device, in which a selector fork can be moved;
- at least one actuation device for controlling the selector fork;
- at least one position sensor for detecting the selector fork movement in the selection direction and the shift direction;
- at least one selector shaft; and
- at least one gear plausibility examination device, which, under predetermined conditions, recognizes the identity of a gear as engaged if a position of the selector fork and/or a sliding sleeve, which is detected by the position sensor in accordance with predetermined assignment characteristics, corresponds to the position of the engaged gear, and if the ratio of the transmission input shaft speed and the transmission output shaft speed corresponds to the gear ratio of this gear.

67. Transmission system with a shift mechanism for its actuation, comprising
- a selection-shift-passageway device, in which a selector fork can be moved;
- at least one actuation device for controlling the selector fork;
- at least one position sensor for detecting the selector fork movement in the selection direction and the shift direction;
- at least one selector shaft; and
- at least one gear recognition device, which, under predetermined conditions, completely engages a motor vehicle clutch in a controlled and deliberate matter, at least part of the time, before establishing the engaged ratio based upon the ratio of the motor speed and at least one wheel speed, and comparing this with a ratio that is assigned to the gears when the clutch is in the engaged mode.

68. Transmission system in accordance with claim 67 characterized in that the motor vehicle clutch contains a hydraulic clutch release system, which, in order to ensure the accuracy of the release motion, has a volume control

device for the hydraulic fluid, wherein the gear recognition device detects the engaged gear during a volume control process of the hydraulic fluid, at least part of the time.

69. Transmission system, especially in accordance with at least one of the claims 67 and 68, characterized in that, under predetermined conditions, the gear recognition device controls a movement of the transmission during the detection of the gear, in which process the selector fork is guided in a predetermined shift passageway to a stop, specifically an end stop, so that, in the case of a gripping clutch, and when the gear has been recognized, this detected stop position is compared with a stored value, to implement a new initiation of the passageway measurement process using an incremental passageway sensor.

70. Control device for controlling a shift mechanism of a transmission system, in accordance with at least one of the previous claims, wherein this control device controls the actuation device of the shift mechanism, at least part of the time, for the purpose of generating a selector fork movement.

71. Method for controlling a shift mechanism of a transmission system, especially an automatic transmission of a motor vehicle, which comprises a selection motor and a shift motor for controlling a selector fork that is movably mounted in a selection-shift-passageway device, for the automated detecting of predetermined geometric values of the transmission system and/or the shift mechanism via the following steps:

- displacement of the selector fork in the orientations of the shift direction and/or the selection direction for the purpose of detecting the travel passageways in the selection direction and/or shift direction, which is possible even from a specific position that is unknown in terms of its coordinates within the selection-shift-passageway device;

- evaluation of the detected travel passageways in accordance with a predetermined characteristic value;
- approach of a new position within the selection-shift-passageway device based upon the results of this evaluation;
- displacement of the selector fork in the orientations of the selection direction and/or in the orientations of the shift direction for the purpose of determining the maximum travel passageways that are possible starting from the newly approached position;
- evaluation of the travel passageways in accordance with an additional predetermined characteristic value;
- approach of a new position based upon the results of the evaluation; and
- repetition of the sequences: determination of the maximum travel passageway, evaluation of those maximum travel passageways and approach of a new position for the purpose of determining the maximum travel passageway given in this position, until the predetermined geometric transmission values have been completely detected.

72. Method for controlling a shift mechanism of a transmission system, which contains a selection motor and a shift motor for controlling a selector fork that is movably mounted in a selection-shift-passageway device, for the purpose of detecting predetermined geometric values of the transmission system and/or the shift mechanism via the following steps:
- controlling and approaching a predetermined position, which is clearly defined in the selection direction and/or shift direction, within the selection-shift-passageway device starting from a position that is unknown in terms of its coordinates within the selection-shift-passageway device; and
- detecting the geometric values in accordance with a predetermined characteristic value, starting from this approached position.

73. Method, especially in accordance with at least one of the claims 71 and 72, characterized in that the geometric values comprise at least information from a group of information that includes the neutral gear positions, the synchronized positions, the passageway position, and the passageway width.

74. Method, especially in accordance with at least one of the claims 71 through 73, characterized in that, under predetermined conditions, the travel passageways and/or the stops and/or one stop of the selector fork against a passageway wall are established in accordance with a predetermined characteristic value, based upon the time progression of at least one predetermined operating parameter, such as the time progression of motor tension and/or angular motor position and/or motor speed and /or angular motor acceleration and/or motor tension and/or motor current and/or a combination of the above-mentioned parameters or other similar parameters.

75. Method for controlling a shift mechanism of a transmission system, which comprises a selection motor and a shift motor for controlling a selector fork that is movably mounted in a selection-shift-passageway device, for the purpose of examining and/or fine tuning the neutral position of the transmission system and/or establishing predetermined wall positions of the selection passageway, with the following steps:

- control of the selector fork for moving the selector fork within the selection passageway in the selection direction across a first, predetermined length, with a first, predetermined orientation;
- control of the selector fork for moving the selector fork in the shift direction by at least one increment in a second, predetermined orientation when the selector fork is not deflected by resistance in the shift direction during movement in the selection direction;

- control of the selector fork for moving the selector fork in the selection direction in a third direction with a third orientation over a third, predetermined distance;
- control of the selector fork for moving the selector fork in a fourth direction with a fourth orientation, by at least one increment when the selector fork is not deflected in the shift direction during movement in the selection direction; and
- repetition of the above-described steps until the selector fork is deflected, during the control process for moving the selector fork in the selection direction, by resistance in the shift direction, and/or until the selector fork is hindered by resistance in its continued movement in the selection direction, before it has traversed the predetermined travel distance in the selection direction.

76. Method in accordance with claim 75, characterized in that the second direction and the fourth direction, and the second orientation and the fourth orientation, are identical.

77. Method, especially in accordance with at least one of the claims 75 and 76, characterized in that the first direction corresponds to the third direction, and the first orientation is opposite the third orientation.

78. Method, especially in accordance with at least one of the claims 75 through 77, characterized in that the predetermined distances in the selection direction correspond basically to the length of the selection passageway, at the latest following the second approach process, in which the selector fork is moved in the selection direction.

79. Method, especially in accordance with at least one of the claims 75 through 78, characterized by the following step: determining that a first boundary of

the neutral position has been reached when, during the control process that allows movement in the selection direction, the selector fork is deflected by resistance in the shift direction, and/or when the selector fork strikes a stop before reaching the predetermined distance of travel in the selection direction.

80. Method, especially in accordance with at least one of the claims 75 through 79, comprising the following steps:
- detecting a first boundary for the neutral position that extends along the longitudinal axis of the selection passageway, with this position being arranged in a fifth position in the shift direction, relative to the center of the neutral passageway; and
- detecting a second boundary for the neutral position that extends along the longitudinal axis of the selection passageway, with this position being arranged in a sixth position in the shift direction, relative to the center of the neutral passageway.

81. Method, especially in accordance with claim 80, comprising the following intermediate step: approaching the position within the selection passageway in the shift direction, which the selector fork assumed when the first limit of the neutral position was first detected, after the first limit of the neutral position was detected.

82. Method for controlling a shift mechanism of a transmission system, which has a selection motor and a shift motor for controlling a selector fork that is movably mounted in a selection-shift-passageway device, for the purpose of detecting and/or controlling an absolute selector fork position within the selection-shift-passageway device, wherein the movement of the selector fork in the shift direction, and the movement of the selector fork in the selection direction, are both detected at least part of the time by a passageway sensor, via the following step: performing an absolute

alignment at predetermined times and/or upon the expiration of predetermined time intervals and/or upon the occurrence of predetermined events, wherein the absolute alignment produces a position of the selector fork within the selection-shift-passageway device whose location within the selection-shift-passageway device is known, wherein

- during the absolute alignment process on the selector shaft, in accordance with a predetermined transformation, a movement is executed that is based upon the movement of the selector fork;
- a digital sensor scans a digital field, which corresponds to a field that is transformed in the selection-shift-passageway device, and which is moved with the selector shaft under predetermined conditions; and
- based upon the digital change (0-1; 1-0) detected by this digital sensor and/or the orientations of the travel directions of the selector forks that occur during the digital change, in accordance with a predetermined characteristic value, a predetermined point, especially a predetermined point among a plurality of predetermined points, is approached within the selection-shift-passageway device.

83. Method in accordance with claim 82, characterized in that, upon reaching the predetermined point, each of the passageway sensors is set to a predetermined value that has been assigned to this position in accordance with a characteristic assignment value.

84. Method, especially in accordance with at least one of the claims 82 and 83, characterized in that a point for determining an absolute position in the selection direction and a point for determining an absolute position in the shift direction are approached separately.

85. Method for controlling a shift mechanism of a transmission system, which has a selection motor and a shift motor for controlling a selector fork that is movably mounted in a selection-shift-passageway device, for the purpose

of determining and/or engaging the neutral gear of the transmission system, comprising the following step: implementing and/or controlling a neutral reference movement when certain predetermined conditions exist, wherein

- neutral reference movement represents a sequence of motor actuations and/or selector fork actuations that are specified in accordance with a predetermined neutral reference movement characteristic; with those sequences of actuations, the selector fork can be moved into a neutral position that corresponds to the neutral gear, independent of the starting position of the selector fork;
- the neutral reference movement characteristic value represents a predetermined sequence of tactile processes and pressing processes, wherein a tactile process involves especially a supply of current to a motor, which is continued until it is determined that the selector fork has hit a stop and/or a predetermined distance has been traveled; and wherein a pressing process involves especially a supply of current to a motor, which is continued until it is determined that the selector fork has moved in the direction of travel specified by the motor; and
- the tactile processes, the selection processes, and the combinations of tactile and selection processes are implemented only in predetermined directions based upon critical gears within the selection-shift-passageway device, which are predetermined based upon location.

86. Method in accordance with claim 85, characterized in that a tactile process in the shift direction is implemented only in conjunction with a pressing process in the selection direction.

87. Method, especially in accordance with at least one of the claims 85 and 86, characterized in that a predetermined condition for initiating neutral reference movement exists when

- during travel it is determined that, with a disengaged clutch, the motor speed and the vehicle speed do not coincide with a gear that is recognized as being engaged; and/or
- it is determined that the controlled positions are not being approached correctly; and/or
- it is determined that, in accordance with a predetermined characteristic value, passageways of movement for the selector fork that are assigned to a predetermined position and are stored do not coincide with the actual passageway movements; and/or
- a control device for controlling the shift motor and/or the selection motor and/or the selector fork has been switched off or reset; and/or
- components of the transmission system and/or the shift mechanism and/or a control device, which controls the shift mechanism, have been newly installed and/or replaced.

88. Method, especially in accordance with at least one of the claims 85 through 87, characterized in that neutral reference movement is executed only when, in accordance with a predetermined characteristic value, and based upon at least one predetermined operating parameter for a motor vehicle, it has been ensured that neutral reference movement will not cause any damage to the transmission system and/or the shift mechanism, and/or that the motor vehicle is not in a predetermined operating mode that would have to be interrupted in order to execute the neutral reference movement.

89. Method, especially in accordance with at least one of the claims 85 through 88, characterized in that neutral reference movement is refused and/or interrupted when the vehicle speed exceeds a predetermined vehicle speed, and/or when a kick-down operation exists, and/or when the throttle valve angle is within a predetermined range.

90. Method, especially in accordance with at least one of the claims 85 through 89, characterized in that, during neutral reference movement, one gear that is not equal to zero is prevented from shifting into another gear that is not equal to zero.

91. Method, especially in accordance with at least one of the claims 85 through 90, characterized in that the selection-shift-passageway device is envisioned as a double-H shifting pattern, in which the shift passageway that is assigned to the first gear is positioned on the top left, and the shift passageway that is assigned to the reverse gear is positioned on the bottom right, wherein during neutral reference movement only tactile and/or pressing processes are performed in directions that are comprised of a group of directions, comprised of a direction oriented toward the left, a direction oriented toward the right, an overlap of a direction that is oriented downward by a direction that is oriented toward the left, and an overlap of a direction that is oriented upward by a direction oriented toward the right.

92. Method, especially in accordance with claim 91, comprising the following steps:

- initiating neutral reference movement under predetermined conditions;
- tactile process in both orientations in the selection direction, for the purpose of determining the passageways of movement in the selection direction;
- determining that the neutral gear is engaged when the passageway of movement in the selection direction is greater than a predetermined value, and establishing that the selector fork is at the end of the selection passageway in whose direction the last tactile process occurred;
- tactile process in the forward shifting direction (F-tactile) with simultaneous pressing in the right selection direction (R-pressing) when

the passageway of movement is smaller than a predetermined passageway of movement;

- right-left-right tactile process (RLR-tactile) for purposes of control in the selection direction if no stop is detected, and/or if a pressing to the right is successful so that movement to the right is detected;
- establishing that a right end of the neutral gear is engaged when the passageway of movement in the selection direction that has been established within the framework of the RLR tactile process is greater than a predetermined value;
- rear tactile process (R-tactile) with simultaneous left pressing (L-pressing) when the passageway of movement in the shift direction that has been established within the framework of the RLR tactile process is below a predetermined value, or when a stop is detected during a F-tactile process with simultaneous R-pressing;
- LR-tactile process when, within the framework of the R-tactile process with simultaneous L-pressing, no stop is detected, and/or if a pressing to the left is successful, so that a movement to the left can be detected;
- establishing that the right end of the neutral gear is engaged when the LR control tactile process has produced a passageway of movement that is greater than a predetermined passageway of movement;

wherein

- a LR tactile process is a combination of a tactile process to the left followed by a tactile process to the right, a F-tactile process is a forward tactile process, a R-tactile process is a backward tactile process, a RLR tactile process is a combination of a tactile process to the right, followed by a tactile process to the left, and then a tactile process to the right, R-pressing is a pressing to the right, and L-pressing is a pressing to the left;
- left and right represent orientations in the selection direction;
- front and rear represent orientations in the shift direction; and

- the shift passageway of the first gear and the shift passageway of the reverse gear are positioned on the outside in the selection-shift-passageway device, to the left front or the right rear.

93. Method, especially in accordance with at least one of the claims 85 through 92, characterized by the following step: repeating reference movement and/or shut-down in accordance with a predetermined characteristic value, when predetermined errors are detected during the reference movement.

94. Method, especially in accordance with at least one of the claims 85 through 93, characterized by the following steps:
- approaching a final position in the selection direction;
- approaching a predetermined position in the direction of the selection passageway after locating the selection passageway, wherein, in accordance with a predetermined characteristic value, it has been ensured that within the area of this position no shift passageway joins the selection passageway; and
- moving in the shift direction, to establish the stops on the selection passageway in the shift direction, for the purpose of establishing the neutral position in the shift direction.

95. Method in accordance with claim 94, with the following step: monitoring the selection position during movement in the shift direction, in order to ensure that the selector fork is not moved into a shift passageway as a result of slippage.

96. Method for controlling a shift mechanism of a transmission system, which has a selection motor and a shift motor for controlling a selector fork that is movably mounted in a selection-shift-passageway device, for the purpose of establishing at least one predetermined neutral position and/or for

detecting a malfunction of the shifting and/or selection motor and/or at least one position sensor of the shift motor and/or the selection motor, comprising the following steps:

- moving the selector fork in the direction of at least one wall of a passageway;
- overpressing the selector fork beyond its stop position that is formed by the passageway wall;
- reducing and/or setting to zero the force applied to the selector fork by at least one motor, causing the selector fork to be moved back in the direction of the passageway as a result, at least, of restoring forces, such as the restoring force of the selector fork and/or shifting fork; the respective element, such as the selector fork, is then released from stress, and assumes a position within the passageway configuration, relative to the stop, that is basically predetermined and/or already known;
- detecting of the reverse movement of the selector fork from its overpressed position back to its unstressed position by a position sensor, especially by a position sensor that is arranged on a motor;
- comparing the predetermined position with the final value of the position sensor; and
- establishing that the selecting and/or shift motor and/or the position sensor of the selecting and/or shift motor exhibits a malfunction when the final value of the position sensor deviates more than a predetermined amount from the predetermined and/or previously known unstressed position of the selector fork, and/or adapting the position that is generated by the position sensor.

97. Method in accordance with claim 96, characterized in that a stop is formed by a shift passageway wall that borders the neutral position.

98. Method for controlling a shift mechanism of a transmission system, which has a selection motor and a shift motor for controlling a selector fork that is movably mounted in a selection-shift-passageway device, for the purpose of detecting at least one neutral position, comprising the following steps:
- moving the selector fork in the direction of the final stop within a shift passageway, in accordance with a predetermined movement characteristic;
- overpressing the selector fork beyond the stop, in accordance with a predetermined control characteristic;
- reducing and/or setting to zero the force with which the selector fork is controlled, in accordance with a predetermined characteristic value, so that the selector fork is pushed back within the shift passageway in the shift direction as a result of restoring forces, such as the restoring force of the selector fork and/or of a shifting fork, and assumes a position, in which it is basically without tension; and
- establishing the location of the neutral position of the engaged gear as relative to this position, in accordance with a predetermined characteristic assignment value, in the selection direction and/or the shift direction.

99. Method for controlling a shift mechanism of a transmission system, which has a selection motor and a shift motor for controlling a selector fork that is movably mounted in a selection-shift-passageway device, for the purpose of determining the width of a predetermined passageway in a selection-shift-passageway device, comprising the following steps:
- controlling the selector fork in the direction of a longitudinal wall of a predetermined passageway, in accordance with a predetermined control characteristic;
- overpressing the selector fork on this wall in accordance with the predetermined characteristic value;

- relieving the selector fork in accordance with a predetermined characteristic value, so that the selector fork is moved back in the direction of the passageway width as a result of to the restoring forces of the selector fork and/or a shifting fork; the selector fork then comes to rest in a largely unstressed mode in a first predetermined position in the direction of the width;
- repeating the above-named steps in relation to the second wall of this passageway located opposite the center of the passageway; and
- determining the width of the passageway in accordance with a predetermined characteristic value, based upon the distance between those unstressed selector fork positions.

100. Method, especially in accordance with at least one of the claims 96 through 99, characterized in that the stop, especially a passageway wall, is detected via an indirect method, such as the detection of the standstill position of a motor based upon its position sensor, or via force measurement or measurement of the armature current of a motor or similar device, and/or based upon the time progression of predetermined operating parameters, with a predetermined evaluation characteristic.

101. Method, especially in accordance with at least one of the claims 71 through 100, comprising the following step: adapting predetermined stored positions of the selection-shift-passageway device, based upon at least one unstressed selector fork position that has been generated in accordance with at least one of the claims 96 through 100.

102. Method for controlling a shift mechanism of a transmission system, which has a selection motor and a shift motor for controlling a selector fork that is movably mounted in a selection-shift-passageway device, with clearance allowed for the selector fork within the shift passageways in the selection

direction, designed for providing and /or determining the identity of a gear that is engaged in a transmission system, comprising the following steps:

- encoding the identity of the engaged gear when this gear is being engaged, in accordance with a predetermined characteristic value, especially by moving the selector fork in a predetermined position range within the clearance range of the engaged final gear; this position range within the clearance area is assigned the identity of the engaged gear, in accordance with a predetermined characteristic assignment value; and
- decoding the gear identity information at predetermined intervals;

wherein

- the decoding process is independent of the final value of the position sensor, which follows the movement of the selector fork while the gear is being engaged, wherein this final value is basically assigned the position of the selector fork within the selection-shift-passageway device that the selector fork reached before starting the decoding process; and
- the engaged gear is maintained during the decoding process.

103. Method, especially in accordance with claim 102, characterized in that for the purpose of decoding the gear identity the selector fork is controlled in the direction of the shift passageways and/or in the direction of the selection passageway within the final gear, wherein, using at least one characteristic geometric value, especially at least one characteristic geometric value of the shifting gate of the transmission, and using at least one travel distance within the final gear in the shift direction and/or in the selection direction, the engaged gear is determined in accordance with a predetermined characteristic.

104. Method for controlling a shift mechanism of a transmission system, which has a selection motor and a shift motor for controlling a selector fork that is

movably mounted in a selection-shift-passageway device, with the selector fork exhibiting clearance within the shift passageways in the selection direction, for the purpose of detecting a malfunction of a selection motor and/or a position sensor of the selection motor, comprising the following steps:

- controlling a movement of the selector fork in the selection direction within a shift passageway under predetermined conditions, in accordance with a predetermined characteristic value;
- detecting the passageway change in the selection direction that is generated by the position sensor during the controlled movement in the selection direction;
- comparing the passageway change in the selection direction produced by the position sensor with the passageway change in the selection direction specified in accordance with the predetermined characteristic value; and
- establishing that the position sensor of the selection motor and/or the selection motor is experiencing functional impairment when the comparison shows a passageway deviation, at least part of the time, that is greater than a predetermined passageway deviation.

105. Method in accordance with claim 104, which is performed when a gear is being disengaged.

106. Method for controlling a shift mechanism of a transmission system, which has a selection motor and a shift motor for controlling a selector fork that is movably mounted in a selection-shift-passageway device, for the purpose of determining the identity of an engaged gear and/or for checking existing information about an engaged gear, comprising the following steps:

- producing a test and/or control signal, which serves to ensure that a starting clutch of a motor vehicle is in a gripping state, especially via a controlled engagement of the starting clutch; and

- determining the identity of the engaged gear based upon the engine speed and wheel speed, in accordance with a predetermined characteristic value, which assigns a gear based upon the gear ratios that are determined by those speed figures.

107. Method in accordance with claim 106, characterized in that the method is initiated when predetermined failure conditions, especially sensor problems or contradicting position data, are detected.

108. Method, especially in accordance with at least one of the claims 106 and 107, characterized in that the clutch device is actuated at least part of the time by a hydraulic release system, which has a volume control device designed to generate a predetermined volume in a predetermined area of the hydraulic release system; the method in accordance with at least one of the claims 106 and 107 is implemented, at least part of the time, at the same time as the volume control process.

109. Method, especially in accordance with at least one of the claim 106 through 108, characterized by a position sensor, which produces position values that describe the position of the selector fork within the selection-shift-passageway device, and with which the identity of the shiftable gears can be determined based upon a gear position characteristic, comprising the following steps:

- comparing the gear identity that is produced via a method in accordance with at least one of the claims 106 through 108 with the gear identity that is produced based upon the characteristic assignment value for the position gear identity; and
- generating error data when deviations exist between this gear identity information, and/or adapting the gear identity and/or position that is detected in the characteristic assignment value for the position gear

identity with the gear identity and/or position that is generated via a method in accordance with at least one of the claims 106 through 108.

110. Method, especially in accordance with at least one of the claims 106 through 109, comprising the following step: moving the selector fork in the shift direction in order to determine the stop position, under predetermined conditions, thus ensuring that a gear is engaged, and/or newly initializing the passageway measuring process.

111. Method for controlling a shift mechanism of a transmission system, which has a selection motor and a shift motor for controlling a selector fork that is movably mounted in a selection-shift-passageway device, for the purpose of determining the identity of an engaged gear and/or for checking information about an engaged gear, comprising the following steps:

- determining the deviation between the target value and the actual value of the selector fork, wherein this deviation between the target value and the actual value is between the target position, which is assigned to a predetermined gear by a gear characteristic position assignment value, and the actual positions of the selector fork detected by the position sensors; and
- monitoring the supply of current to the selection motor;

wherein the gear identity produced by the characteristic position assignment value is selected as the actually existing gear identity when

- the deviation between target value and actual value is below than a predetermined limit;
- the target position in the selection direction is reached within a predetermined first period of time, and/or the selection motor remains in the switch-off hysteresis mode for at least a predetermined period of time once the target position is reached.

112. Method in accordance with claim 111, characterized in that the predetermined boundary corresponds basically to the width of the shift passageway which is assigned to the gear that is engaged in accordance with the predetermined gear position characteristic assignment value.

113. Method for operating a shift mechanism of a transmission system in accordance with at least one of the claims 1 through 69.

114. Method for operating a transmission system in accordance with at least one of the claims 1 through 69.

115. Method for operating a control device in accordance with claim 70.

116. Control device for performing a method in accordance with at least one of the claims 71 through 115.

117. Transmission system with a shift mechanism for performing a method in accordance with at least one of the claims 71 through 112.

118. Transmission system with a shift mechanism for its actuation and/or a control device for controlling the shift mechanism of the transmission system, characterized by its particular operation and design in accordance with the present application documents.

119. Transmission system with a shift mechanism for its actuation and/or a control device for controlling the shift mechanism of the transmission system, characterized by at least one feature from at least one of the above claims and/or by the combination of at least two features which are part of the above claims, and/or by at least one feature in accordance with the description, and/or by the combination of at least one feature of the description and at least one feature pursuant to at least one of the previous

claims, and/or by at least one feature in accordance with at least one figure of this application, and/or by at least one individual feature in accordance with the present application.

120. Transmission system with a shift mechanism for its actuation and/or a control device for controlling the shift mechanism of the transmission system, characterized by the combination of at least one feature pursuant to the figures and/or at least one feature pursuant to the description and/or at least one feature pursuant to at least one patent claim.

121. Transmission system with a shift mechanism for its actuation and/or a control device for controlling the shift mechanism of the transmission system in accordance with at least two of the above claims.

122. Use of a transmission system in accordance with at least one of the claims 1 through 69 and 117 for a motor vehicle.

123. Use of a control device in accordance with at least one of the claims 70 and 116 for a motor vehicle.

124. Use of a method in accordance with at least one of the claims 71 through 115 for operating a motor vehicle.